REMARKS/ARGUMENTS

The above-identified patent application has been reviewed in light of the Examiner's Action dated March 8, 2006. Claims 1, 4, 11, 24, 26, 35, 47, 57, and 68 have been amended, without intending to abandon or to dedicate to the public any patentable subject matter. Accordingly, Claims 1-24, 26-58, 60-74 and 76-89 are now pending. As set forth more fully below, reconsideration and withdrawal of the rejections of the claims are respectfully requested.

Initially, applicants would like to thank the Examiner for the courtesies extended during the telephone interview that was held on May 2, 2006. During that interview, the disclosures of the cited references and potential amendments to the claims were discussed. In particular, the provision of a phase retarder separately from a diffractive optical element or a holographic element as described in the present application was suggested as a feature that is not taught, suggested or disclosed by the cited references. In addition, the provision of an immersion lens in association with each detector such that the immersion lens operated on a portion of a beam that had been separated from a composite beam was suggested as an additional feature that is not taught, suggested or disclosed by the cited references. The Examiner indicated that the inclusion of either of these distinguishing features in the claims would overcome the cited references. No final agreement regarding allowable subject matter was reached during the interview.

The present invention is generally directed to the reception of communication signals transmitted using optical wavelengths through free space. In accordance with embodiments of the present invention, a phase retarder is provided separately from the holographic or diffractive element to reduce smear in a signal at a detector. In another aspect, embodiments of the present

invention provide an immersion lens for or associated with each detector, such that a portion of a beam separated from a composite beam and directed towards an individual detector is passed through an immersion lens for the detector towards which the signal portion is detected.

The Claims stand rejected under 35 USC §103 as being unpatentable over U.S. Patent No. 5,757,523 to Wood et al. ("Wood") in view of U.S. Patent No. 5,255,065 to Schwemmer ("Schwemmer"). In order to establish a prima facie case of obviousness under §103, there must be some suggestion or motivation to modify the reference or to combine the reference teachings, there must be a reasonable expectation of success, and the prior art reference or references must teach or suggest all of the claim limitations. (MPEP §2143.) Because the cited references, whether considered alone or in combination, do not teach, suggest or describe passing a received signal through a separately provided phase retarder or passing separated signals through an immersion lens, the rejections of the claims as obvious should be reconsidered and withdrawn.

The Wood reference is generally directed to a method, device, or system used to illuminate a remote target area by passing radiation containing multiple wavelengths through a diffractive hologram. The purpose of the hologram is to diffract the radiation such that a divergent pattern exists which can be used to cover a remote target area. The hologram of Wood consists of a transparent plate on which a surface relief interference pattern has been embossed. The pattern consists of a repeating cell or a unit pattern. The interference pattern in each cell is a binary phase pattern that selectively retards the phase of the incident light. (Wood, col. 3, line 64 to col. 4, line 15.) Accordingly, Wood describes a hologram that consists of a pattern that retards the phase of incident light in order to form a composite beam having a pre-

determined shape or distribution in the far field. However, Wood does not teach, suggest or describe a phase retarder that is provided in addition to the hologram. Wood also does not describe an immersion lens that operates on a portion of a beam that has been separated from a composite beam as set forth in some of the pending claims. Instead, the lens cited in the Office Action as corresponding to the claimed immersion lens is described as being positioned in the path of the composite beam. (Wood, col. 6, lines 17-21.)

Those aspects of the claimed invention that are not described by Wood are also not described by Schwemmer. Moreover, the Schwemmer reference is not cited by the Office Action as disclosing a phase retarder or an immersion lens. Accordingly, elements set forth in the pending claims that cannot be found in Wood are also not taught, suggested or described by Schwemmer.

Accordingly, at least the following italicized features of the independent claims are not found in the cited references:

1. A method for receiving high frequency signals transmitted through free space, comprising:

passing one or more optical signals, the one or more optical signals containing data and being composed of radiation of a plurality of differing wavelengths, through a diffractive optical element to form a plurality of signal segments, each signal segment having a different mean wavelength;

passing a portion of a beam comprising each of said one or more optical signals through a phase retarder that is provided separately from said diffractive optical element, wherein said

portion of said beam passed through the phase retarder comprises an area of the beam that is less than a total area of the beam in cross-section, and

detecting data in each of said plurality of signal segments at or near a different spatial focal point.

11. A method for receiving high frequency signals transmitted through free space, comprising:

dividing an optical signal, the optical signal containing data and being composed of radiation of a plurality of differing wavelengths, into a plurality of signal segments, each signal segment having a different mean wavelength;

passing a portion of one of the divided optical signal and the optical signal through a phase retarder;

reflecting said divided signals towards a plurality of spaced apart detectors;

reducing the spot size of the signal segments using an immersion lens that is integral to each of the plurality of detectors; and

detecting, with said plurality of spaced apart detectors data in each of said plurality of signal segments, wherein each of said spaced apart detectors is located substantially at a different focal point, the focal points being at different positions along a common optical axis.

24. An apparatus for receiving an optical signal transmitted through free space, the optical signal being composed of radiation of a plurality of wavelengths, comprising:

at least one diffractive optical element for focusing radiation of different wavelengths at different corresponding focal points, wherein said focal points are at different positions along the

optical axis of said optical element, wherein said at least one diffractive optical element has a diameter that is greater than a Fresnel scale for said plurality of wavelengths and a distance from a transmitter, and wherein said focal points encompass a first area comprising a first spot size or greater; and

a plurality of detectors, each detector being located at or near a different one of the focal points and receiving the radiation focused on the focal point corresponding to the detector, wherein each of the plurality of detectors has a photoactive area equal to a second area that is less than said first area, *wherein each of said plurality of detectors is associated with a focusing element comprising an immersion lens that reduces the spot size of incident radiation to no more than said second area.*

35. An apparatus for receiving an optical signal transmitted through free space, the optical signal containing data, comprising:

a first holographic element for focusing radiation including a number of different wavelengths, wherein each wavelength is focused to a different point;

a phase retarder having an area that is less than an area of the first holographic element, wherein the phase retarder has a maximum radius that is no greater than 80% of a radius of the first holographic element;

a number of detectors; and

a number of second lenses, wherein one of said second lenses is located between the first lens and an associated detector, the second lens reducing a spot size of the focused radiation after passing through the second lens.

47. A method for receiving high frequency signals transmitted through free space, comprising:

first passing an optical signal, the optical signal containing data, through a first lens comprising a diffractive optical element provided as part of a receiver to form focused radiation having a first mean wavelength, wherein said first lens subtends at least about 50 microradians of a beam comprising the optical signal, wherein at the receiver the optical signal has an angle of divergence of at least 20 microradians, and *wherein less than all of the optical signal containing data is passed through a phase retarder that is provided separately from the diffractive optical element*;

second passing the focused radiation through a second lens to form converging radiation having a second mean wavelength, the first mean wavelength being different than the second mean wavelength; and

detecting data in the convergent radiation.

57. An apparatus for receiving an optical signal, the optical signal containing data, comprising:

a first optical element for focusing a set of different optical wavelengths in the optical signal at different locations along a first optical axis of said first optical element;

a reflective surface for reflecting the focused set of different optical signals and forming a reflected set of different optical signals; and

a number of detectors, wherein each detector is associated with an immersion lens, wherein the immersion lens of each detector is positioned to receive one of the reflected optical signals, the immersion lenses being located along the first optical axis.

68. A method for receiving an optical signal transmitted through free space, comprising:

first passing the optical signal, the optical signal containing data, through a first lens to form a plurality of signal segments, each corresponding to a different median wavelength, wherein the first lens is a diffractive optical element;

second passing a portion of the optical signal through a phase retarder;

reflecting the plurality of signal segments off a reflective surface to form reflected radiation; and

detecting data in the reflected radiation at or near an optical focal point for each of the signal segments,

wherein the optical signal has a beam size that is less than a size of an inner scale in the vicinity of the source transmitter, and *wherein passing a portion of the optical signal through a phase retarder reduces smear in the signal segments.*

77. A method of manufacturing a detector assembly, comprising:

forming an optical detector on an at least substantially transparent substrate, the optical detector being on a first side of the substrate; and

forming, on an opposed second side of the substrate, a lens, the lens having a refractive index such that a median wavelength of radiation passing through the lens is reduced.

The application now appearing to be in form for allowance, early notification of same is respectfully requested. The Examiner is invited to contact the undersigned by telephone if doing so would expedite the resolution of this case.

Respectfully submitted,

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